Editorial

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This special issue of *MSOR Connections* presents a selection of papers from the inaugural E-Assessment in Mathematical Sciences (EAMS) conference, held in September 2016 at Newcastle University. It is pleasing that there is enough activity in this area to support a two-day international conference on this topic. I am delighted that this issue offers international perspectives on the conference themes, including papers from Finland, Ireland, the Netherlands, Japan and the UK. Conference organisers Chris Graham and Christian Lawson-Perfect provide a brief overview of the conference.

Following the conference introduction, some case studies present approaches to conducting e-assessment in mathematical sciences.

SOWISO is used to create interactive online modules, combining e-assessment and instruction. Heck reports on the use of SOWISO for a course in basic mathematics for psychobiology students, which uses formative assessment and learning through worked examples, in which students reason by writing line by line equivalent expressions, with intelligent feedback. The paper includes an interesting analysis of the preparedness for and performance on the course of students with different entry qualifications.

Kawazoe and Yoshitomi outline the features of the system MATH ON WEB, used to deliver e-learning content and for e-assessment to encourage greater engagement with learning between classes, and describe its use with first year engineering students.

One process for conducting summative e-assessments is to use a computer room with restricted access rights to software and the web. However, there are circumstances where it makes good pedgagogic sense to allow students free(r) access to resources, or when practicalities mean that students cannot attend e-assessments on campus. Brouwer, Heck and Smit give three examples of use of online remote proctoring, using software that allows remote monitoring of students' use of computers.

Papers also focus on the use of e-assessment to facilitate teaching innovation. Henderson reports on the implementation of a flipped-style approach to a first year undergraduate calculus module, supported by formative e-assessment using Dewis. Carroll, Casey, Crowley, Mulchrone and Ní Shé describe the implementation of Numbas e-assessment to increase engagement by providing regular feedback for a large group of business studies students.

One theme of the conference was the presentation of innovative developments in what is possible with e-assessment.

Weir, Gwynllyw and Henderson report on an innovative development of the Dewis e-assessment system, which is capable of communicating with the R statistics package. This means greater sophistication in what can be assessed in statistics e-assessment, and an interface for developing Dewis e-assessments soley by writing R code.

One of the limitations of e-assessment, when compared to pen and paper assessment, is that it guides students and imposes a format on answers. The paper by Harjula, Malinen and Raslila describes an attempt to provide students with more choice when performing multi-step processes through a responsive interface. The paper is quite technical, but I would recommend even non-

technical readers to have a look at section 6 of the paper, which gives an example to show the potential of the system.

One difficulty using e-assessment is that of entering mathematics into computers or, especially, mobile devices. It is extremely cumbersome to type an expression such as '3*x^2-10*x-8' into a smartphone or tablet (which likely involves switching between multiple keyboards). Two possible solutions to this problem are presented. Shirai and Fukui have developed a HTML5 version of MathTOUCH, which accepts a colloquial text string and supports translating this into mathematical notation through a series of menus. Nakamura and Nakahara have developed a novel interface for inputting mathematical expressions using a nested keyboard with flick operation, a method similar to that used to input Japanese characters on a smartphone.

I enjoyed attending the conference, presenting at it and hearing the variety of work that was demonstrated, as well as editing this set of conference proceedings. I hope you will find this selection of papers offers an interesting taste of the nearly 30 presentations at that conference. As mentioned by Graham and Lawson-Perfect in their conference introduction, slides from the conference and videos of talks are available via eams.ncl.ac.uk.

I would like to thank the authors, peer reviewers and conference organisers for their hard work and for sticking firmly to a series of deadlines, which made editing this issue a smooth process.